Atty. Docket No. DP-309231 (DEL01 P-442)

CERTIFICATE OF MAILING

I hereby certify that this paper, together with all enclosures identified herein, are being deposited with the United States Postal Service as first class mail, addressed to the Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, on the date indicated below.

February 20, 2006
Date

Deborah A. Clark
Deborah A. Clark

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Art Unit	:	2814
Examiner	:	DiLinh P. Nguyen
Applicants	:	Thomas S. Ellis et al.
Appln. No.	:	10/608,702
Filed	:	June 27, 2003
Confirmation No.	:	9673
For	:	POLYMER ENCAPSULATED ELECTRICAL DEVICES

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION - 37 CFR §41.37)

1. Transmitted herewith is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on January 19, 2006.

2. STATUS OF APPLICANTS

This application is on behalf of:

_X_ other than a small entity.

___ a small entity.

A verified statement:

___ is attached.

___ was already filed.

3. **FEE FOR FILING APPEAL BRIEF**

Pursuant to 35 USC §41(a)(6), the fee for filing the Appeal Brief is:

___ small entity $250.00

_X_ other than a small entity $500.00

Appeal Brief fee due: $500.00

4. **EXTENSION OF TERM**

The proceedings herein are for a patent application and the provisions of 35 USC §41(a)(8) apply.

(b) _X_ Applicants believe that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. **TOTAL FEE DUE**

The total fee due is:

Appeal Brief fee: $500.00

Extension fee (if any) $

TOTAL FEE DUE: $500.00

6. **FEE PAYMENT**

_X_ Attached is a check in the sum of $500.00.

___ Charge Account No. 16 2463 the sum of $_____.

A duplicate of this transmittal is attached.

7. FEE DEFICIENCY

X If any additional extension and/or fee is required, this is a request therefor and to charge Account No. 16 2463.

and/or

X If any additional fee for claims is required, charge Account No. 16 2463.

Respectfully submitted,

February 20, 2006
Date

Gunther J. Evanina, Registration No. 35 502
Price, Heneveld, Cooper, DeWitt & Litton, LLP
695 Kenmoor, S.E.
Post Office Box 2567
Grand Rapids, Michigan 49501
(616) 949-9610

GJE/dac

Atty. Docket No. DP-309231 (DEL01 P-442)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Art Unit	:	2814
Examiner	:	DiLinh P. Nguyen
Applicants	:	Thomas S. Ellis et al.
Appln. No.	:	10/608,702
Filed	:	June 27, 2003
Confirmation No.	:	9673
For	:	POLYMER ENCAPSULATED ELECTRICAL DEVICES

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPEAL BRIEF (37 CFR §41.37)

This brief is in furtherance of the Notice of Appeal, filed in this case on January 19, 2006.

The fees required under 35 USC 41(a)(6), and any required petition for extension of time for filing this brief and fees therefor, are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains these items under the following headings, and in the order set forth below (37 CFR §41.37(c)):

I. Real Party in Interest

II. Related Appeals and Interferences

III. Status of Claims

IV. Status of Amendments

V. Summary of Claimed Subject Matter

VI. Grounds of Rejection to Be Reviewed on Appeal

VII. Argument

VIII. Conclusion

Appendix of Claims Involved in the Appeal

Evidence Appendix

Related Proceedings Appendix

The final page of this brief bears the attorney's signature.

I. Real Party In Interest

The real party in interest in this application is Delphi Technologies, Inc., P. O. Box 9005, Kokomo, Indiana 46904-9005, the assignment to which was recorded at Reel 014276, Frame 0722.

II. Related Appeals And Interferences

There are not any related appeals or interferences which will directly affect, or be directly affected by, or have a bearing on, the Board's Decision in this Appeal.

III. Status Of Claims

This is an Appeal from the rejection of claims 2, 4-14 and 16-22. Claims 2, 4-14 and 16-22 are pending and under consideration in the application. No claims have been allowed or withdrawn from consideration. Claims 1, 3, 15 and 23 have been cancelled.

IV. Status Of Amendments

There have not been any amendments filed after the Final Rejection being appealed.

V. Summary Of Claimed Subject Matter

Independent claims 4 and 13 are under appeal.

Independent claim 4 is directed to an article 10, in which electrical components, such as semi-conductor chips 14, 16, are encapsulated, overmolded and/or underfilled with a polymeric composite 25. Encapsulation, overmolding and underfilling are described at paragraphs 13 and 14 of the specification (page 5, line 16-page 6 line 17). Polymeric composite 25 comprises a synthetic resin matrix containing a particle filler having a platelet structure defined by opposite substantially flat and substantially parallel faces, wherein the inorganic filler content is 20% or

less by weight based on the weight of the polymeric composite. Composite 25 and the filler are described at paragraphs 15-19 (page 6, line 18-page 8, line 31).

Independent claim 13 is directed to an article 10 having an electrical component (e.g., semi-conductor chips 14, 16) encapsulated, overmolded and/or underfilled with a polymeric composite 25 comprising a thermoplastic resin matrix and an inorganic particulate filler. Thermoplastic polymeric composites are described at paragraphs 20 and 21 (page 9, lines 1-23).

VI. Grounds Of Rejection To Be Reviewed on Appeal

Claims 2 and 4-11 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kaminaga et al. (U.S. Patent No. 6,257,215) in view of Shin et al. (U.S. Patent No. 6,593,404).

Claim 12 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Kaminaga et al. (U.S. Patent No. 6,257,215) in view of Shin et al. (U.S. Patent No. 6,593,404) and further in view of Capote et al. (U.S. Patent No. 6,335,571).

Claims 13, 14 and 16-20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kaminaga et al. (U.S. Patent No. 6,257,215) in view of Shin et al. (U.S. Patent No. 6,593,404).

Claims 21 and 22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kaminaga et al. (U.S. Patent No. 6,257,215) in view of Shin et al. (U.S. Patent No. 6,593,404) and further in view of Yu et al. (U.S. Patent No. 5,153,657).

VII. Argument

Rejection Of Independent Claim 4 and Dependent Claims 2 and 5-11 Under 35 U.S.C. §103

These claims are directed to encapsulated, overmolded and/or underfilled electronic components using an unconventional overmolding, underfilling and/or encapsulating polymeric composite containing fillers having a platelet structure. It is well known in the art that such composites require specific types of particulate fillers that achieve a coefficient of thermal expansion that is intermediate between the coefficient of thermal expansion of the semi-conductor material comprising the electronic component and the coefficient of thermal expansion of a substrate on which the electronic component is mounted. If the polymer resin matrix material

had a suitable coefficient of thermal expansion, fillers would not be needed. By adding a filler material to the encapsulating, underfilling and/or overmolding composition, the coefficient of thermal expansion is appropriately adjusted to minimize stresses that occur as a result of thermal cycling of the device. It is well recognized in the art, as demonstrated by the applied Kaminaga et al. reference, that the encapsulating, overmolding and/or underfilling composition must have a viscosity that is sufficiently low during the step of overmolding, underfilling and/or encapsulating the electronic component to prevent damage of fragile features of the electronic component. It is also well recognized in the art, as demonstrated by the applied Kaminaga et al. reference, that the shape of the particulate filler is important for preventing damage of the electrical components during overmolding, underfilling and/or encapsulating processes. In particular, the prior art, including the applied Kaminaga et al. reference, teaches that the filler should be comprised of rounded (i.e., spherical) particles in order to eliminate or reduce damage during encapsulating, overmolding and/or underfilling. Thus, it has been believed by those having ordinary skill in the art, prior to Appellants' invention, that filler loading of an encapsulating resin composition must be sufficiently high to achieve the desired coefficient of thermal expansion, and that the particles must be sufficiently spheroidal to prevent high shear forces at the high filler loadings, which would otherwise cause damage to the electronic component during flow of the composition during underfilling, overmolding and/or encapsulating processes. The claimed invention departs significantly from the prior state of the art by utilizing unconventional platelet-shaped particulate fillers and by employing unconventionally low filler levels.

Appellants have surprisingly discovered that a desired coefficient of thermal expansion may be achieved with a lower filler level and with a suitably low potential for damage to electronic components by employing a platelet-shaped particulate filler. The platelet structure and dimensions of the filler particles may also result in reduced settling and/or more uniform coefficient of thermal expansion throughout the encapsulating, overmolding and/or underfilling material after solidification or curing, whereby encapsulated, overmolded and/or underfilled electrical components exhibiting improved reliability may be prepared.

Kaminaga et al. (U.S. Patent No. 6,257,215) disclose a resin-sealed electronic device or semi-conductor package that is alleged to achieve enhanced durability at soldered portions and

increased stiffness (column 2, lines 37-45). According to the patent specification, the device comprises a hybrid integrated circuit and a power semi-conductor device secured on a metal heat sink by a tin-antimony alloy solder, all of which are embedded in an epoxy resin comprising 70 to 90 weight percent of an inorganic filler material (column 2, lines 51-63). Kaminaga et al. teach that the "epoxy is preferably arranged so that the content amount of inorganic filler material thereof is specifically adjusted to permit its resultant linear expansion coefficient" to be "midway in value between the linear expansion coefficient of said power semiconductor device and that of said heat sink" (column 3, lines 1-5). The high filler content of the epoxy resin was "expected to more rigidly secure those electronic parts or components mounted within the package in the state that it is harder than traditional epoxy materials for use in standard dielectric molds" (column 3, lines 26-31). This in turn is said "to slow the propagation speed of thermal shocks . . . which can occur due to linear expansion coefficient differences between the power semi-conductor device and the heat sink," making "it possible to improve the durability or performance properties at soldered portions of the power semiconductor device" (column 3, lines 33-39). It is also disclosed that the inorganic filler material "may be a rounded filler, such as for example fused silica, in order to reduce or minimize risks of damage at semiconductor components" (column 6, lines 10-13). Kaminaga et al. state that thermal deformation is suppressed by the high stiffness of the tin-antimony alloy-based solder and by the use of an epoxy package employing "a specific inorganic filler material" (column 6, lines 42-50, emphasis added). The only specific inorganic filler disclosed by Kaminaga et al. is a rounded (i.e., spherical) silica filler. It is further stated that suppression of any possible thermal expansion and shrinking deformation of the power semi-conductor device 3 and/or heat sink 1 is expected "because of the fact that the epoxy containing therein such high compound inorganic filler material is expected to more rigidly secure those electronic components mounted within the package 1 in the state that it is harder than traditional epoxy materials for use in standard dielectric molds" (column 6, lines 51-61).

The Shin et al. patent (U.S. Patent No. 6,593,404) discloses flame retardant thermoplastic resin compositions comprising a polycarbonate, a styrene-containing graft copolymer, a styrene-containing copolymer, a mixture of alkyl-substituted monophosphate esters, a phosphate ester, and a fluorinated polyolefin (column 2, line 61-column 3, line 55). This composition is alleged

to exhibit an improved combination of stress cracking resistance and heat resistance as compared with conventional flame retardant polycarbonate resin compositions (column 2, lines 38-49). According to Shin et al., the use of phosphate ester-based flame retardants in conventional polycarbonate resin compositions has caused reduced heat resistance and reduced stress cracking resistance (column 1, lines 47-50). In accordance with the invention of Shin et al., reduced degradation of stress cracking property and heat resistance property in a flame retardant polycarbonate resin composition is achieved by employing "flame retardants comprising a phosphate ester in a mixture of alkyl substituted, preferably t-butyl substituted, monophosphate esters . . ." (column 2, lines 52-59). It is disclosed that these flame retardant polycarbonate resin compositions may optionally further comprise conventional additives, such as "inorganic fillers, thermal stabilizers, antioxidants, light stabilizers, plasticizers, pigments, dyes, and mold releasing agents" in a total amount of 0 to 50 parts by weight per 100 parts by weight of the base resin (column 6, lines 55-62). Disclosed fillers are "mica, talc, zeolite, and montmorillonite."

The Examiner's position is that "it would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the particles of Kaminaga et al. by having inorganic fillers such as montmorillonite, as taught by Shin et al., in order to provide excellent stress cracking resistance and improve heat resistance (column 2, lines 54-56) and improve adhesion for the semiconductor package." The Examiner has argued that the rejection is justified because the "selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co., Inc. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945)."

Kaminaga et al. do not disclose any problems associated with stress cracking or heat resistance. Shin et al. do not teach or suggest that montmorillonite may be employed for the purpose of providing excellent stress cracking resistance and/or improved heat resistance in either a polycarbonate resin composition or in an epoxy resin composition, such as the one disclosed by the primary reference, Kaminaga et al. Instead, Shin et al. disclose that a mixture of alkyl-substituted monophosphate esters and a phosphate ester may be added to a polycarbonate resin composition to provide flame retardancy while achieving improved stress cracking resistance and improved heat resistance as compared with previous flame-retardant polycarbonate resin

compositions. Thus, the Examiner has mistakenly attributed the benefits of using alkyl-substituted monophosphate esters to montmorillonite, whose only disclosed purpose is to act as a filler. The person of ordinary skill in the art would not make this same mistake, and, therefore, would not be motivated to replace the rounded silica filler favored by Kaminaga et al. with platelet-shaped montmorillonite based on an expectation of achieving improved heat resistance and/or based on an expectation of achieving improved stress cracking resistance. In fact, Shin et al. do not claim to have discovered additives for improving stress cracking resistance and/or improving heat resistance for a polycarbonate resin, but instead allege to have discovered a flame retardant composition that does not degrade the intrinsic stress cracking resistance and/or intrinsic heat resistance of a polycarbonate resin.

The allegation that one of ordinary skill in the art would have been motivated to replace the rounded silica filler employed by Kaminaga et al. with montmorillonite based on an expectation of achieving improved adhesion is also without merit. Kaminaga et al. do not disclose any problem with adhesion, and Shin et al. do not suggest that a montmorillonite filler has any effect on the adhesive properties of either a polycarbonate resin composition as disclosed therein, or on an epoxy resin as disclosed by Kaminaga et al. In fact, Shin et al. do not disclose that a montmorillonite filler has any function other than as a filler (e.g., an extender that reduces the cost of the composition). Thus, one having ordinary skill in the art would not have any basis for expecting that use of montmorillonite, instead of silica, would have any effect on the adhesive properties of an epoxy resin. Accordingly, one having ordinary skill in the art would not have been motivated to use montmorillonite as a filler, rather than rounded silica, in the epoxy resin composition used by Kaminaga et al. for encapsulating an electronic device.

The Examiner has also argued that the use of montmorillonite as a filler in an epoxy resin composition used for encapsulating an integrated circuit device merely represents the "selection of a known material based on its suitability for its intended use," and, as such, is *prima facie* obvious based on the holding in *Sinclair & Carroll Co.* The decision of Sinclair was based on a finding that a primary reference taught the desirability of developing an ink utilizing a solvent having a low vapor pressure (e.g., 1 inch of mercury or less) at room temperature (e.g., 80°F.) and a high vapor pressure (e.g., at least 30 inches of mercury) at an elevated temperature (e.g.,

150°F.), and a finding that a secondary reference disclosed a solvent having the desired properties. The court determined that a first reference that teaches everything about a claimed composition except for the identify of a specific ingredient, but which discloses the critical properties of that unspecified ingredient, when combined with a second reference disclosing an ingredient having properties identical to the critical properties disclosed in the first reference is sufficient to establish *prima facie* obviousness.

A more appropriate generalization of the rule of law from the *Sinclair* case is that a combination of references that teach all of the ingredients of a claimed composition and which disclose the desirability of combining all of the ingredients of the claimed composition are sufficient to establish *prima facie* obviousness. In *Sinclair*, the primary reference disclosed an ink composition that would be useful for high speed printing on non-absorbent paper having a glossy finish if a solvent having a suitably low vapor pressure at room temperature and a suitably high vapor pressure at elevated temperature could be found. The secondary reference in the *Sinclair* case describes a solvent having the desired properties identified as critical in the primary reference. It was predicted by the primary reference that such a solvent would prevent the ink from drying on the printing press, yet allow it to rapidly dry upon application of heat, thereby facilitating high speed printing onto non-absorbent, glossy paper of the type that has been employed in the printing of magazines for over 70 years. Thus, in *Sinclair*, the primary reference taught the appropriate properties of a solvent needed to achieve the claimed ink, and the secondary reference taught a solvent having those identical properties.

The facts at issue in this Appeal are entirely different. The Kaminaga et al. patent (the primary reference) does not teach that a low filler content (20% or less by weight of the polymeric composition) can be used to achieve a suitable coefficient of thermal expansion or that non-spheroidal fillers could be used to achieve desirable rheological properties that are needed for encapsulating, overmolding and/or underfilling electronic components. Instead, Kaminaga et al. teach that a filler content higher than conventional amounts is employed to achieve the desired coefficient of thermal expansion and the desired stiffness needed to achieve durability when mounting electronic components on a metal heat sink using a lead-free (e.g., tin-antimony) solder. Additionally, Kaminaga et al. teach that the filler should be rounded to prevent damage

to the electronic component during encapsulation. Thus, rather than identifying the desirability of employing low levels (less that 20%) of a filler having a platelet structure, Kaminaga et al. urge the exact opposite, i.e., high levels (70% to 90%) and a rounded filler.

Prior to Appellants' discovery, it was not known that platelet fillers could be employed at low levels to achieve a coefficient of thermal expansion that would adequately match the coefficient of thermal expansions of a semi-conductor device and a substrate on which the device is mounted. It was previously believed that high filler loadings were needed to achieve a suitable coefficient of thermal expansion. At the same time, it was also believed that rounded (i.e., spherical) filler particles were needed to achieve a sufficiently low viscosity that would avoid damage to the electronic component by high shear forces imposed during flow of the epoxy resin composition while the electronic component is being encapsulated. There was absolutely no recognition in the prior art of the fact that filler shape has a profound influence on the coefficient of thermal expansion of the encapsulating resin composition. Without an appreciation of this fact, the person of ordinary skill in the art would not have considered using particles having a platelet shape in an overmolding, underfilling and/or encapsulating composition for electronic compounds. A resin composition containing montmorillonite or other particulate filler having a platelet shape would have been expected to have a very high viscosity that would cause damage to an electronic component mounted on a substrate during encapsulation of the component. At the time the invention was made, a person of ordinary skill in the art would have been surprised to learn that a platelet filler could be employed at a low level to provide an appropriately low viscosity which would prevent damage to fragile electronic components during encapsulation, and at the same time achieve the required coefficient of thermal expansion that is needed to reduce stresses imposed by thermal cycling of the device, and thereby provide satisfactory durability of the device.

Without Appellants' invention, there is no apparent connection between Kaminaga et al. and Shin et al. The applied references do not teach or suggest that montmorillonite or any other filler having a platelet shape were ever intended to be used by anyone for the purpose of adjusting the coefficient of thermal expansion of an encapsulating composition in an electronic device as claimed. Kaminaga et al. teach high levels of rounded fillers, not low levels of a platelet filler.

Shin et al. teach nothing of relevance with respect to the claimed invention. Shin et al. only disclose that montmorillonite may be added as a filler to a flame retardant polycarbonate resin composition. Shin et al. teach nothing about problems that must be addressed when formulating a composition for encapsulating an electronic component. Thus, Shin et al. do not give a person of ordinary skill in the art any reason to expect that montmorillonite could be used as a filler for suitably adjusting the coefficient of thermal expansion of a resin composition for encapsulating an electronic device, while simultaneously achieving a sufficiently low viscosity to prevent damage to the device during encapsulation. The mere fact that montmorillonite has been suggested as a filler in a different composition (a flame retardant polycarbonate resin composition) used in unrelated applications (e.g., housings for electrical appliances) for undisclosed reasons is not relevant to the claimed invention, and would not have motivated those having ordinary skill in the art to employ montmorillonite instead of a rounded filler in the epoxy resin encapsulating composition used in the device described by Kaminaga et al. Shin et al. simply do not provide any expectation that montmorillonite can be successfully employed to modify the coefficient of thermal expansion of an encapsulating composition for an electronic device.

Further, the low filler level (less than 20%) of the claimed invention contradicts Kaminaga et al., who disclose that high filler levels are needed, not just to achieve the desired coefficient of thermal expansion, but also to achieve a suitable stiffness which is needed "to slow the propagation speed of thermal shocks" and provide suitable durability and performance properties for an electronic device soldered to a metal heat sink. Shin et al. do not provide any expectation that the lower filler levels of the claimed invention could be successfully used for achieving the stiffness required by Kaminaga et al.

There is no motivation for the claimed invention. The alleged motivations are based on misunderstandings regarding the teachings of the prior art. The allegation that Shin et al. teach encapsulated electronic devices is patently false. The allegation that Shin et al. teach that montmorillonite improves adhesive properties of resins is patently false. The allegation that the prior art teaches that montmorillonite improves stress cracking resistance of resin compositions is

patently false. The allegation that the prior art teaches that the addition of montmorillonite to a resin improves heat resistance is patently false.

The rejection is also based on a misunderstanding and/or misapplication of the law of *Sinclair*. *Sinclair* held that the prior art references must provide a teaching sufficient to motivate one having ordinary skill in the art to combine reference teachings. Neither of the applied references suggests that montmorillonite is a suitable filler for a composition used to encapsulate an electronic component.

To use montmorillonite, or any other filler in an amount of less than 20% in an encapsulating, underfilling or overmolding composition for an electronic component, as required by the claims, is contrary to the teachings of Kaminaga et al. which require a high filler loading (70-90%) and the use of "a specific inorganic filler material" (column 6, lines 42-50), with the only specific filler disclosed being rounded silica. Thus, not only is there a complete absence of motivation for the claimed invention, but the prior art also clearly leads those of ordinary skill in the art away from the claimed invention. For these reasons, a reversal of the rejection of claims 2 and 4-11 is required and respectfully requested.

Rejection Of Claims 13, 14 and 16-20 Under 35 U.S.C. §103

These claims are directed to an article in which an electronic component is encapsulated, overmolded and/or underfilled with a polymeric composite having a thermoplastic resin matrix and an inorganic particulate filler.

It has been discovered that thermoplastic polymer materials may be used in an injection molding process (e.g., RIM) to encapsulate, overmold and/or underfill electronic components, such as integrated circuit devices mounted on a printed circuit board. The use of a thermoplastic encapsulating, overmolding and/or underfilling composition is more economical than the use of conventional thermosetting resin compositions. In addition, thermoplastic encapsulants, overmoldings and underfillings are tougher and provide better protection against shock and impact than the conventional thermoset encapsulating, overmolding and underfilling compositions.

The Examiner has taken the position that Kaminaga et al. disclose an encapsulated, overmolded, and/or underfilled electrical component, that Shin et al. disclose a semiconductor device comprising a thermoplastic resin composition including an inorganic particular filler, and that it would have been obvious to one having ordinary skill in the art at the time the invention was made "to select the thermoplastic resin composition as known material, as taught by Shin et al. and the device structure of Kaminaga et al. for forming polymeric composite, such that the thermoplastic resin would provide excellent stress cracking resistance and improve heat resistance (column 2, lines 54-56)." As with the previous rejection, the Examiner argues that the rejection is justified because "selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair* . . .."

This rejection is based entirely on misunderstandings pertaining to the teachings of the prior art and on misapplication of the law in *Sinclair & Carroll Co., Inc.* The allegation that Shin et al. disclose a semi-conductor device comprising a thermoplastic resin composition including an inorganic particulate filler is patently false. The allegation that the prior art teaches that the addition of montmorillonite improves stress cracking resistance is patently false. The allegation that the prior art teaches that the addition of montmorillonite to a resin composition improves heat resistance is patently false. When the false bases for the rejection are properly considered, there is nothing left of the rejection.

Kaminaga et al. disclose conventional thermoset encapsulating compositions. Shin et al. disclose thermoplastic resin compositions for other applications (e.g., housings for electrical appliances). These teachings would not have motivated one having ordinary skill in the art to use a thermoplastic resin for underfilling, overmolding or encapsulating an electronic component, rather than the thermoset resin disclosed by Kaminaga et al.

There is no evidence of record showing that thermoplastic resin compositions were previously intended to be used as an encapsulating, underfilling or overmolding composition for an electronic component.

For these reasons, it is respectfully submitted that a reversal of the rejection of claims 13, 14 and 16-22 is required, and is earnestly requested.

Other Rejections

Dependent claim 12 which was rejected under 35 U.S.C. §103 as being unpatentable over the Kaminaga et al. patent in view of the Shin et al. patent and further in view of Capote et al. (U.S. Patent No. 6,335,571) is patentable for the reasons stated above.

Dependent claims 21 and 22 which were rejected under 35 U.S.C. §103 as being unpatentable over Kaminaga et al. in view of Shin et al. and further in view of Yu et al. (U.S. Patent No. 5,153,657) are also patentable for the reasons set forth above with respect to the independent claims from which claims 21 and 22 depend.

VIII. Conclusion

In view of the absence of any motivation in the prior art for using a thermoplastic matrix or a montmorillonite filler at low levels in a composition used for encapsulating an electronic component, and in view of express teachings against the use of low filler levels and/or non-spheroidal filler particles, it is respectfully submitted that a reversal of all rejections is appropriate.

Respectfully submitted,

February 20, 2006
Date

Gunther J. Evanina, Registration No. 35 502
Price, Heneveld, Cooper, DeWitt & Litton, LLP
695 Kenmoor, S.E.
Post Office Box 2567
Grand Rapids, Michigan 49501
(616) 949-9610

GJE/dac

Appendix of Claims (35 USC §41.37(c)

2. The compound of claim 4, wherein the electrical component is a substrate having an electrical circuit formed on at least one surface of the substrate and at least one semi-conductor chip electrically connected to the electrical circuit.

4. An encapsulated, overmolded and/or underfilled electrical component, comprising:

an electrical component encapsulated, overmolded and/or underfilled with a polymeric composite including a synthetic resin matrix and inorganic filler particles substantially uniformly distributed in the matrix, the particles having a platelet structure defined by opposite substantially flat and substantially parallel faces, the inorganic filler content being 20 percent or less by weight based on the weight of the polymeric composite.

5. The component of claim 4, wherein the inorganic filler content is 15 percent or less by weight based on the weight of the polymeric composite.

6. The component of claim 4, wherein the filler is a smectite clay mineral.

7. The component of claim 6, wherein the smectite clay mineral is montmorillonite.

8. The component of claim 4, wherein the matrix is a thermoset resin.

9. The component of claim 8, wherein the thermoset resin is selected from epoxy, phenolic, polyurethane and polyurea resins.

10. The component of claim 4, wherein the matrix is a thermoplastic resin.

11. The component of claim 10, wherein the thermoplastic resin is selected from polyamides, copolyamides, polycarbonates, polyesters and copolyesters.

12. The component of claim 4, wherein the composite has a CTE from about 5 to 20 ppm/°C.

13. An encapsulated, overmolded and/or underfilled electrical component, comprising:

an electrical component encapsulated, overmolded and/or underfilled with a polymeric composite including a thermoplastic resin matrix and an inorganic particulate filler.

14. The component of claim 13, wherein the electrical component is a substrate having an electrical circuit formed on at least one surface of the substrate and at least one semi-conductor chip electrically connected to the electrical circuit.

16. The component of claim 13, wherein the inorganic filler content is 20 percent or less by weight based on the weight of the polymeric composite.

17. The component of claim 13, wherein the inorganic filler content is 15 percent or less by weight based on the weight of the polymeric composite.

18. The component of claim 13, wherein the filler is a smectite clay mineral.

19. The component of claim 18, wherein the smectite clay mineral is montmorillonite.

20. The component of claim 13, wherein the resin is selected from the group consisting of polyamides, copolyamides, polyesters, copolyesters and polycarbonates.

21. The component of claim 13, wherein the inorganic particulate filler is glass spheres.

22. The component of claim 21, wherein the glass spheres have an average diameter of from about 1 micrometer to about 50 micrometers.

Evidence Appendix (35 USC §41.37(c))

There was no evidence submitted during this application under 37 CFR §1.130, 1.131 or 1.132 or any evidence entered by the Examiner and relied upon by Appellants in the appeal.

Related Proceedings Appendix (35 USC §41.37(c))

There are no related appeals or interferences pending during this appeal.